

# Core Europe Results

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UAT-WP-8-07  
Presented to UAT MOPS WG

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# Core Europe Assumptions

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- Link 16 Baseline, option B - no antenna effects
- UAT self-interference
- Co-site 1030, 1090, DME, UAT transmissions assumed to prevent reception during time of transmission
- Several altitude options
  - ◆ Highest # of other aircraft in view (usually FL300-400)
  - ◆ FL150
- Transmit Powers
  - ◆ A0/A1: 38.5-42.5 dB
  - ◆ A2: 42-46 dB
  - ◆ A3: 50-54 dB

# Core Europe Assumptions II

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- Several receiver configuration options
  - ◆ Diversity receivers
  - ◆ Switched receiver
- A0 restrictions
  - ◆ Up to FL180
  - ◆ Switches Tx/Rx between antennas
- Receive filters
  - ◆ Diversity receivers evaluated for both 0.8 MHz and 1.2 MHz
  - ◆ Switched receiver evaluated for 1.2 MHz only

# Core Europe Assumptions III

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- Time frames
  - ◆ 2001 (current)
    - All currently operating DMEs (including 978 and 979 MHz)
    - To get an idea of performance in current environment
    - Assumed to consist of 1200 aircraft
  - ◆ 2015 (future)
    - All DMEs at 978 MHz have been moved to another frequency
    - All potential planned DMEs at 979 MHz assumed to be implemented
    - To get an idea of performance with 978 MHz DMEs removed from picture, if all planned 979 MHz DMEs are implemented (worst case)
    - Full Core Europe 2015 scenario (2091 aircraft)
- Two locations considered for each time frame
  - ◆ Most aircraft in view near center of scenario (over Brussels)
  - ◆ Location of “worst case” DME interference within scenario

# DME Interference Levels for High Altitudes

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- Transmit powers as assigned
- Measured TACAN antenna pattern
- 8 dB rule implemented

Current			Future		
Nominal	Channel-Type	Worst Case	Nominal	Channel-Type	Worst Case
-75	On TACAN	-75	-76	Adj. DME	-76
-70	On TACAN	-71	-71	Adj. TACAN	-70
	On TACAN	-77	-64	Adj. TACAN	-62
-61	Adj. TACAN	-57			

# DME Interference Levels at FL150

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- Transmit powers as assigned
- Measured TACAN antenna pattern
- 8 dB rule implemented

Current			Future		
Brussels	Channel-Type	Worst Case	Nominal	Channel-Type	Worst Case
-75	On TACAN	-76	-76	Adj. DME	-56
	On TACAN	-76	-69	Adj. TACAN	-64
	On TACAN	-77	-68	Adj. TACAN	-72
-68	Adj. TACAN	-51			

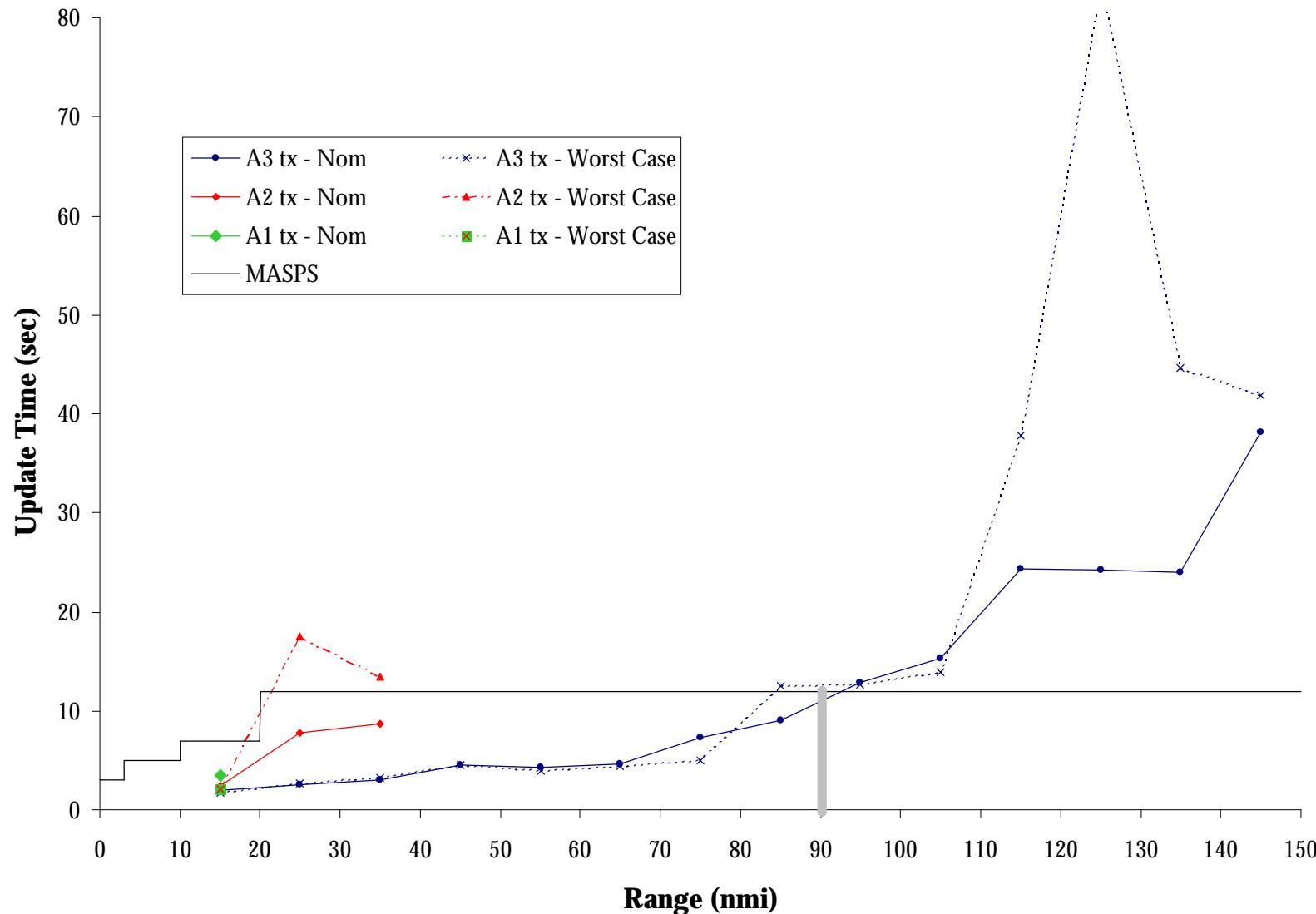
# Current Scenario Results

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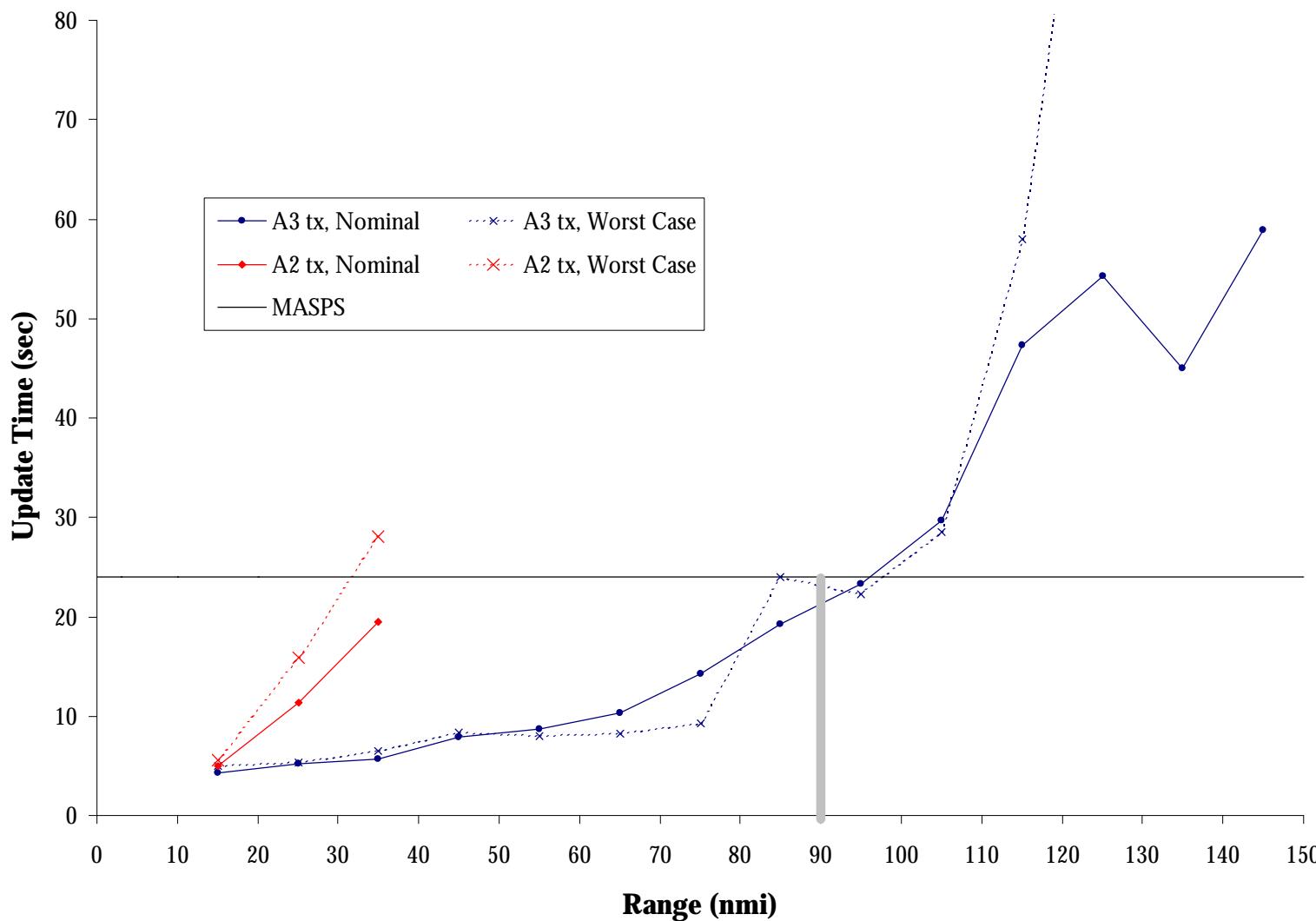
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- Two locations
  - ◆ Brussels – highest density air traffic area, conservative DME estimates
  - ◆ Worst case – lower density air traffic, greater DME interference
- DME levels as calculated for two flight levels
  - ◆ Most traffic in view (high altitude)
  - ◆ FL 150
- Performance today with no DME modifications
- Different receiver types

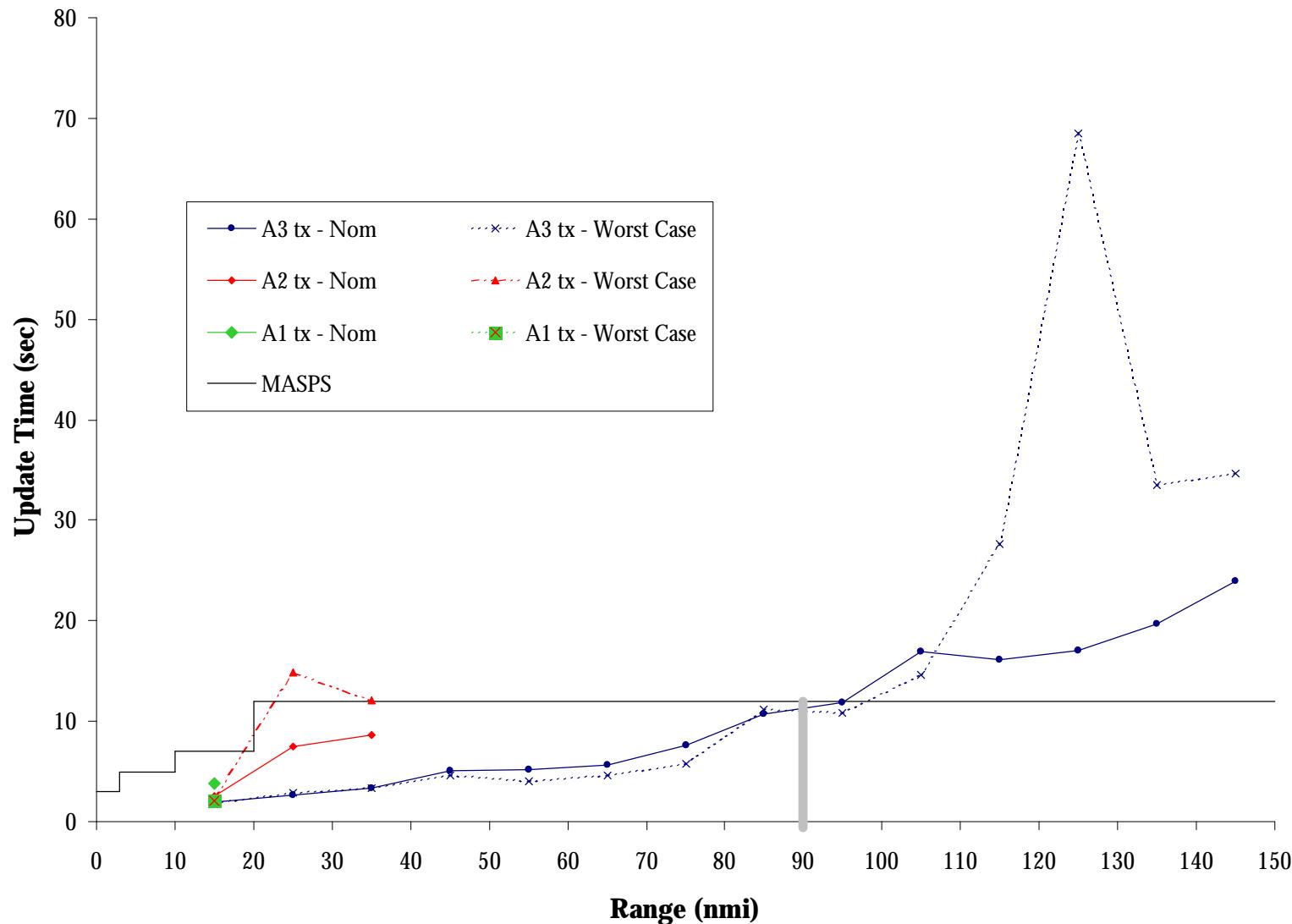
# Current State Vector Update Times for Diversity Receiver at High Altitude with 1.2 MHz Filter



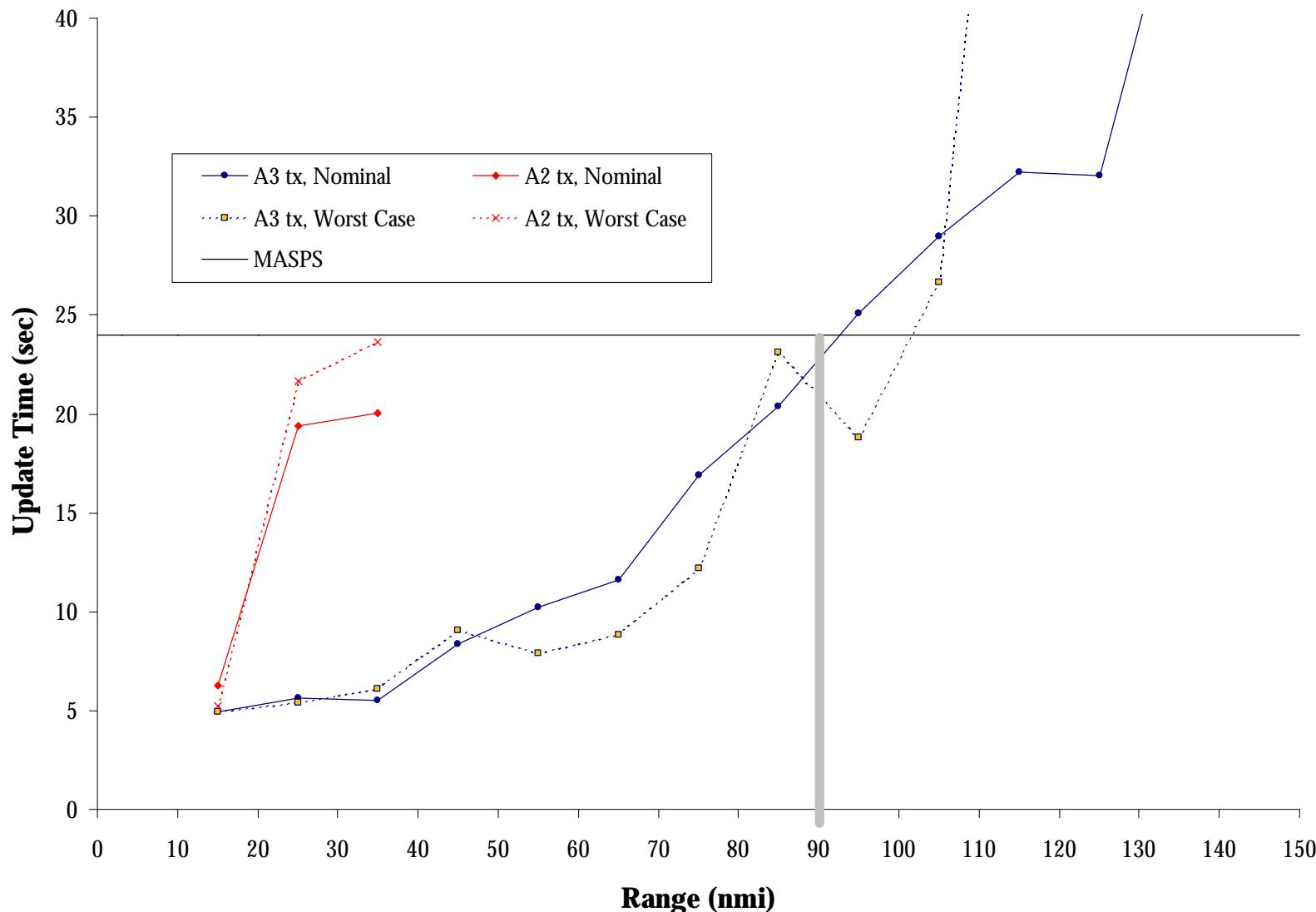
# Current TCP Update Times for Diversity Receiver at High Altitude with 1.2 MHz Filter



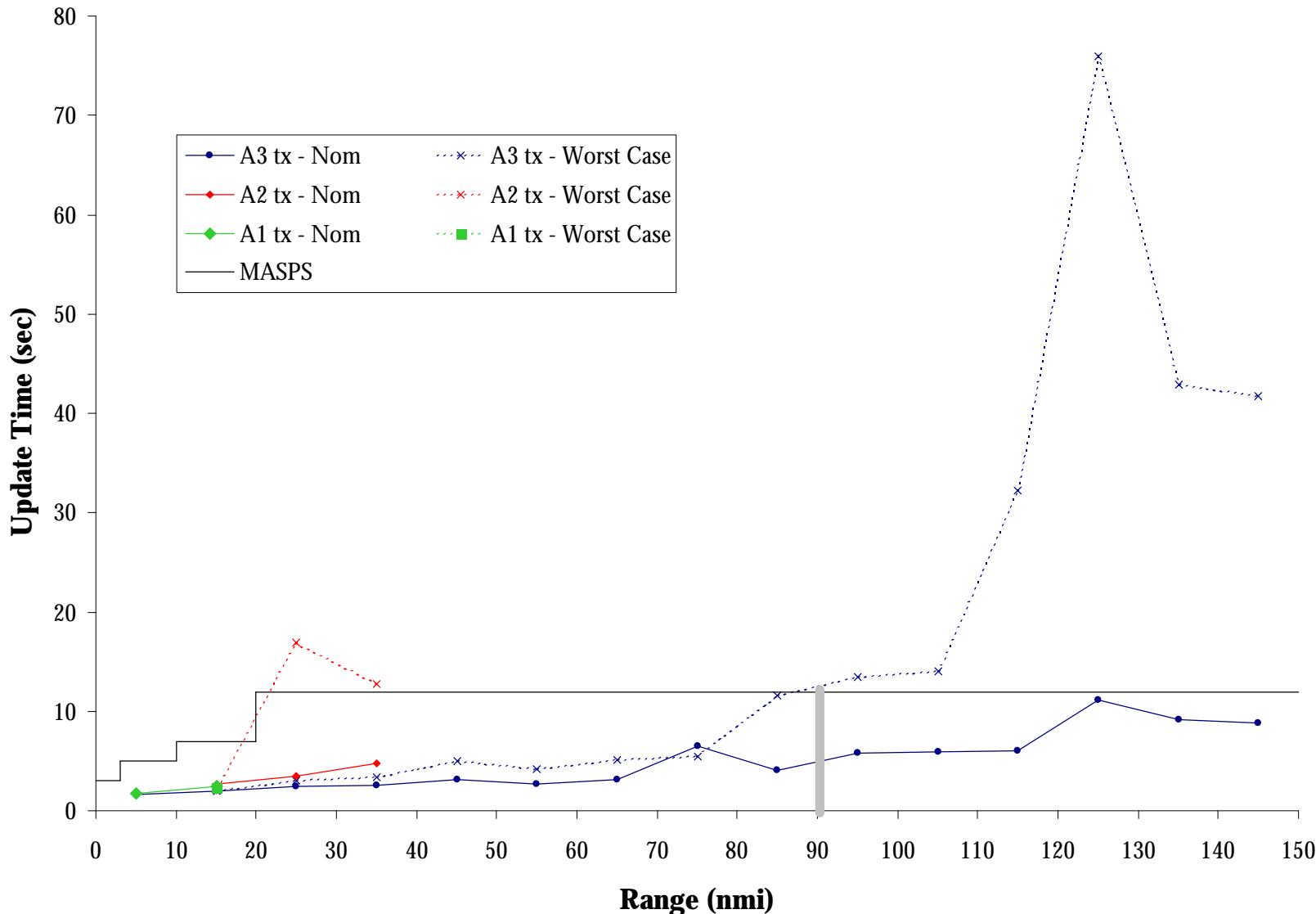
# Current State Vector Update Times for Diversity Receiver at High Altitude with 0.8 MHz Filter



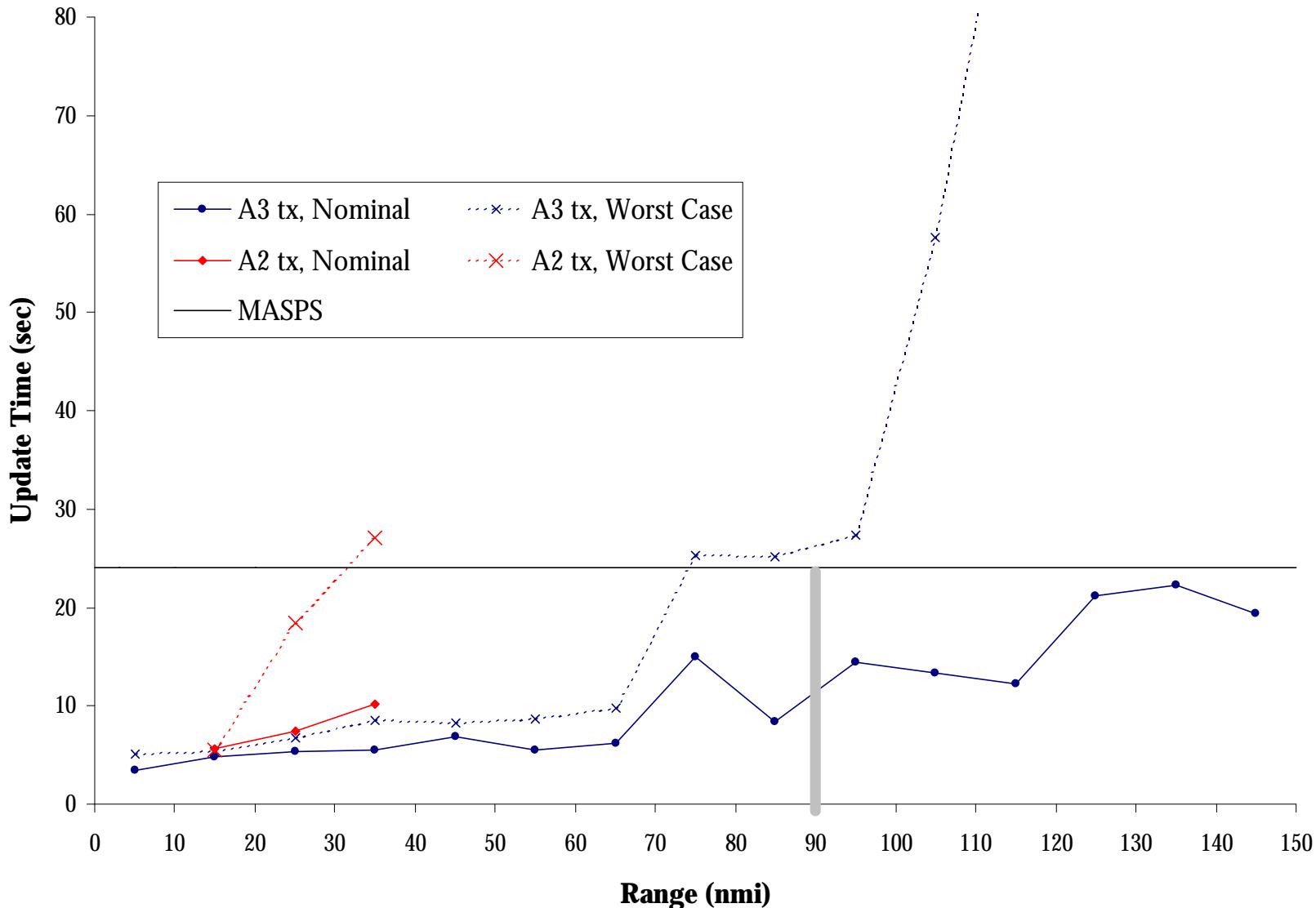
# Current TCP Update Times for Diversity Receiver at High Altitude with 0.8 MHz Filter



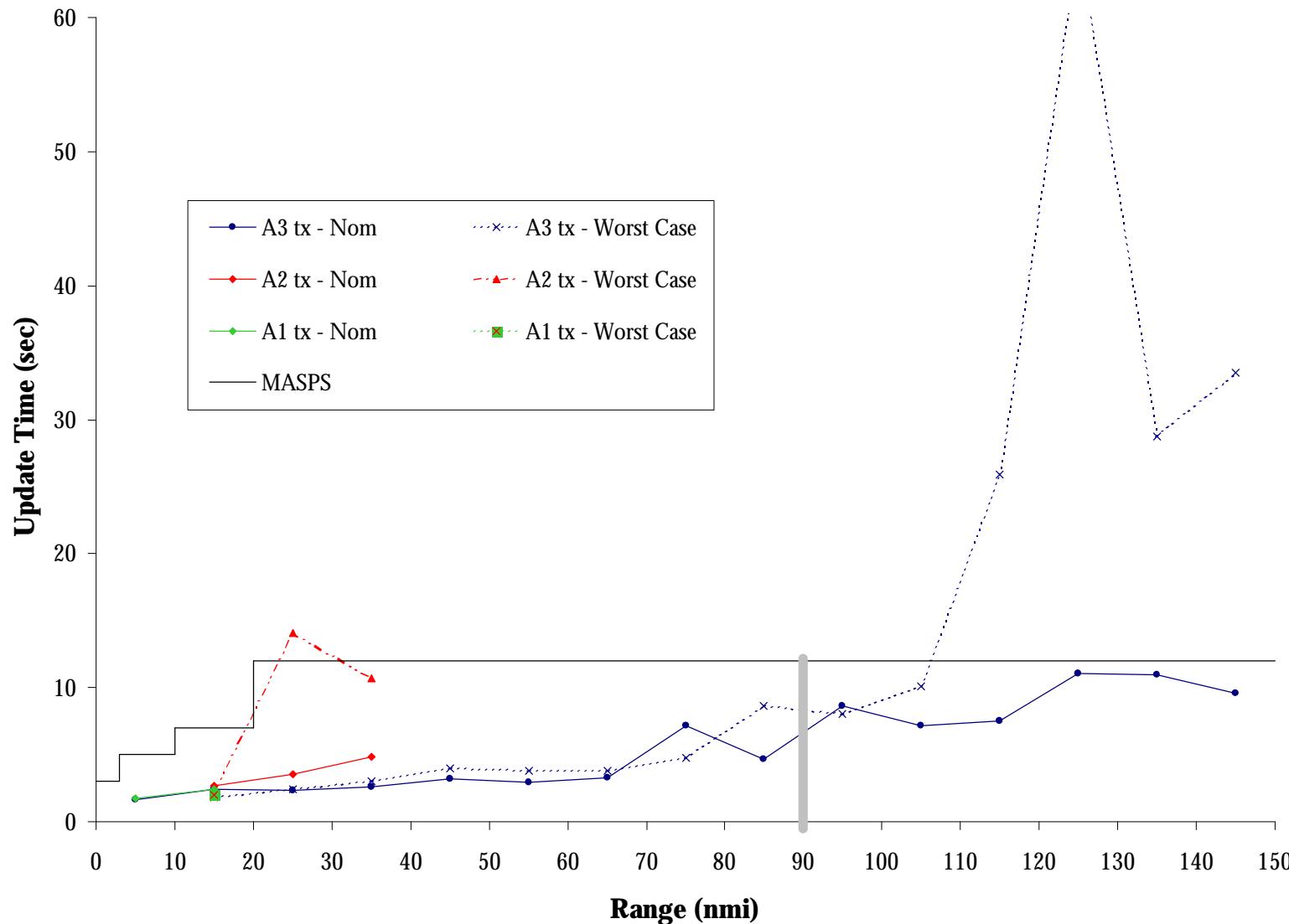
# Current State Vector Update Times for Diversity Receiver at FL150 with 1.2 MHz Filter



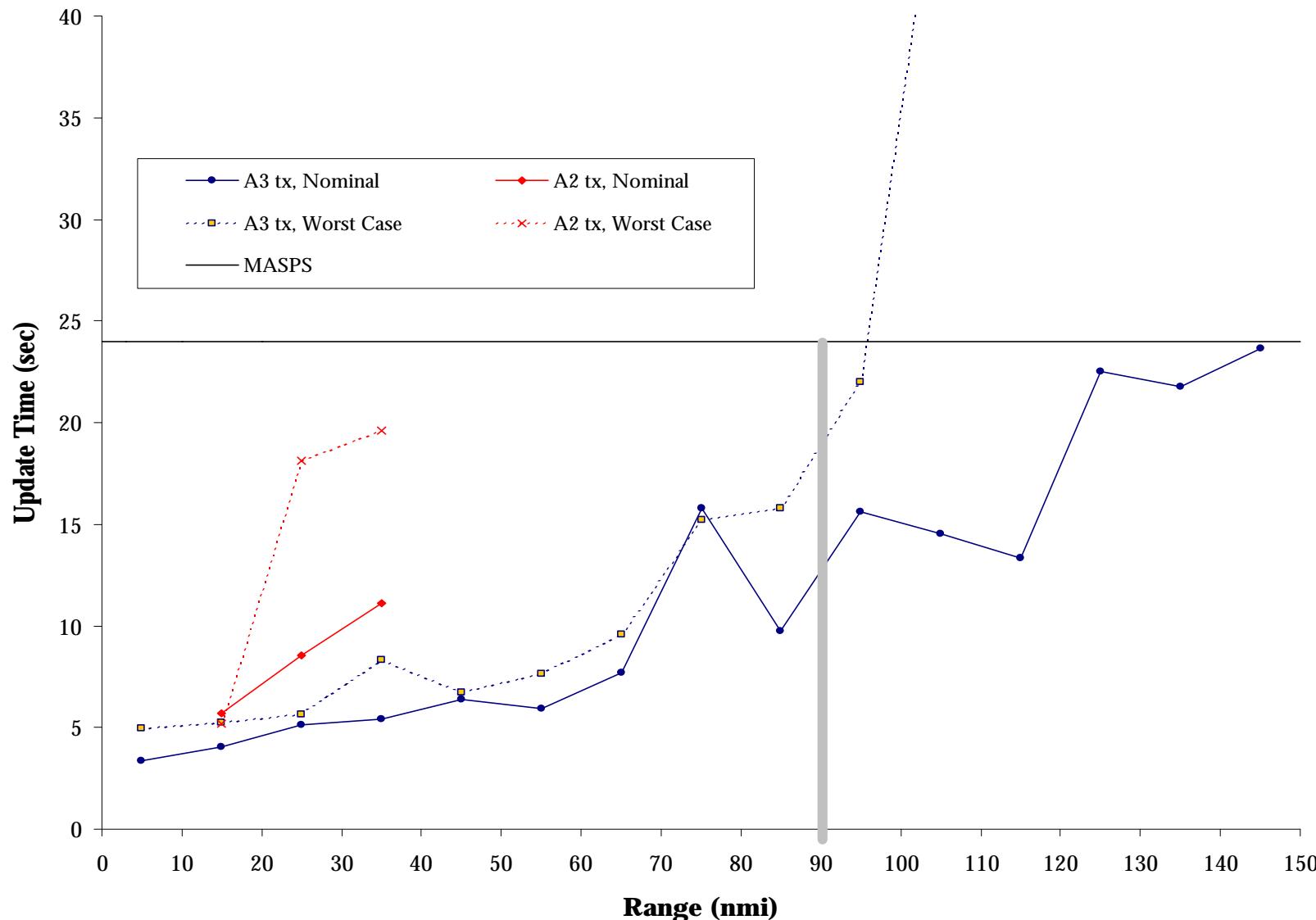
# Current TCP Update Times for Diversity Receiver at FL150 with 1.2 MHz Filter



# Current State Vector Update Times for Diversity Receiver at FL150 with 0.8 MHz Filter



# Current TCP Update Times for Diversity Receiver at FL150 with 0.8 MHz Filter

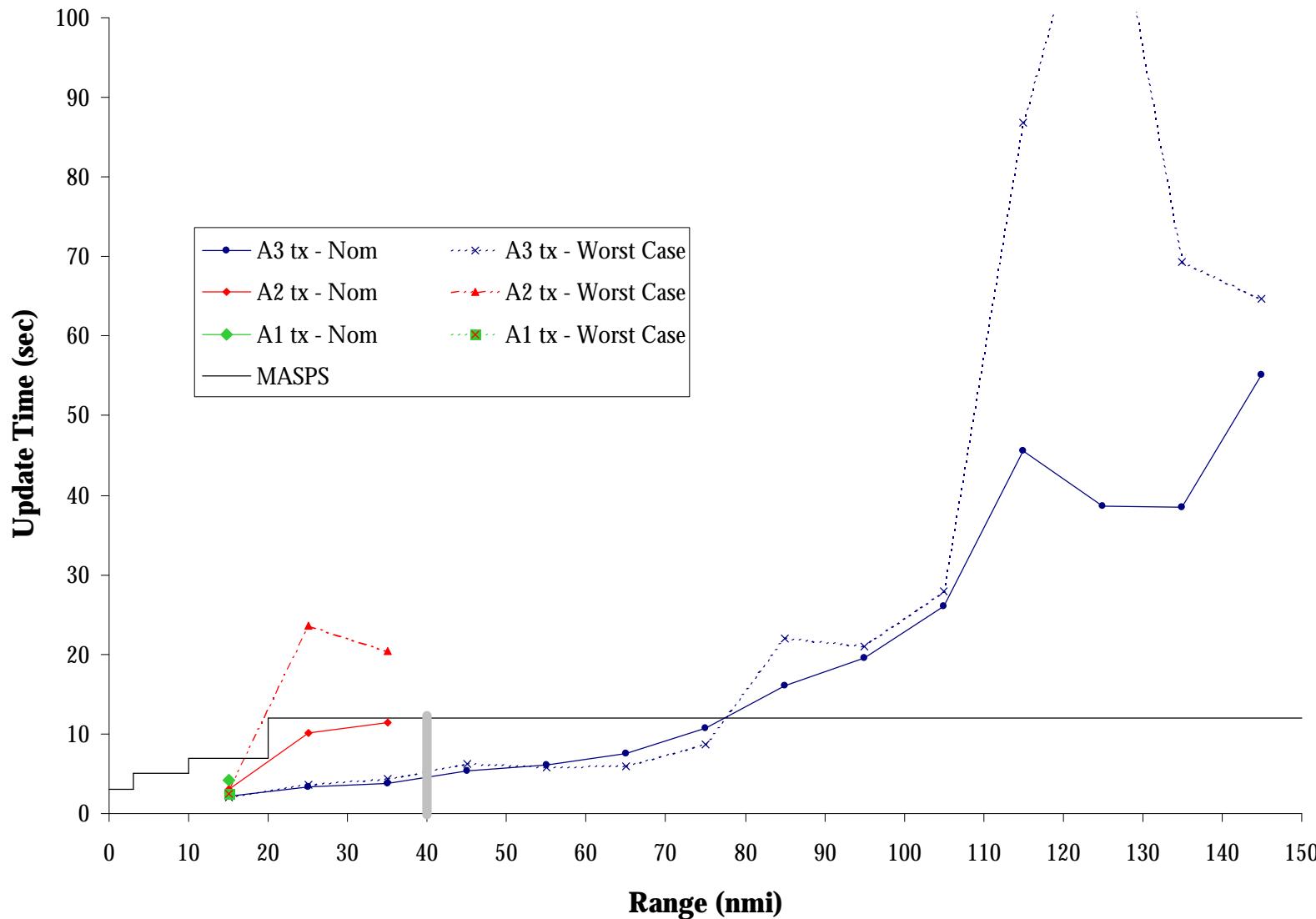


# Current Scenario Results for Diversity Receiver

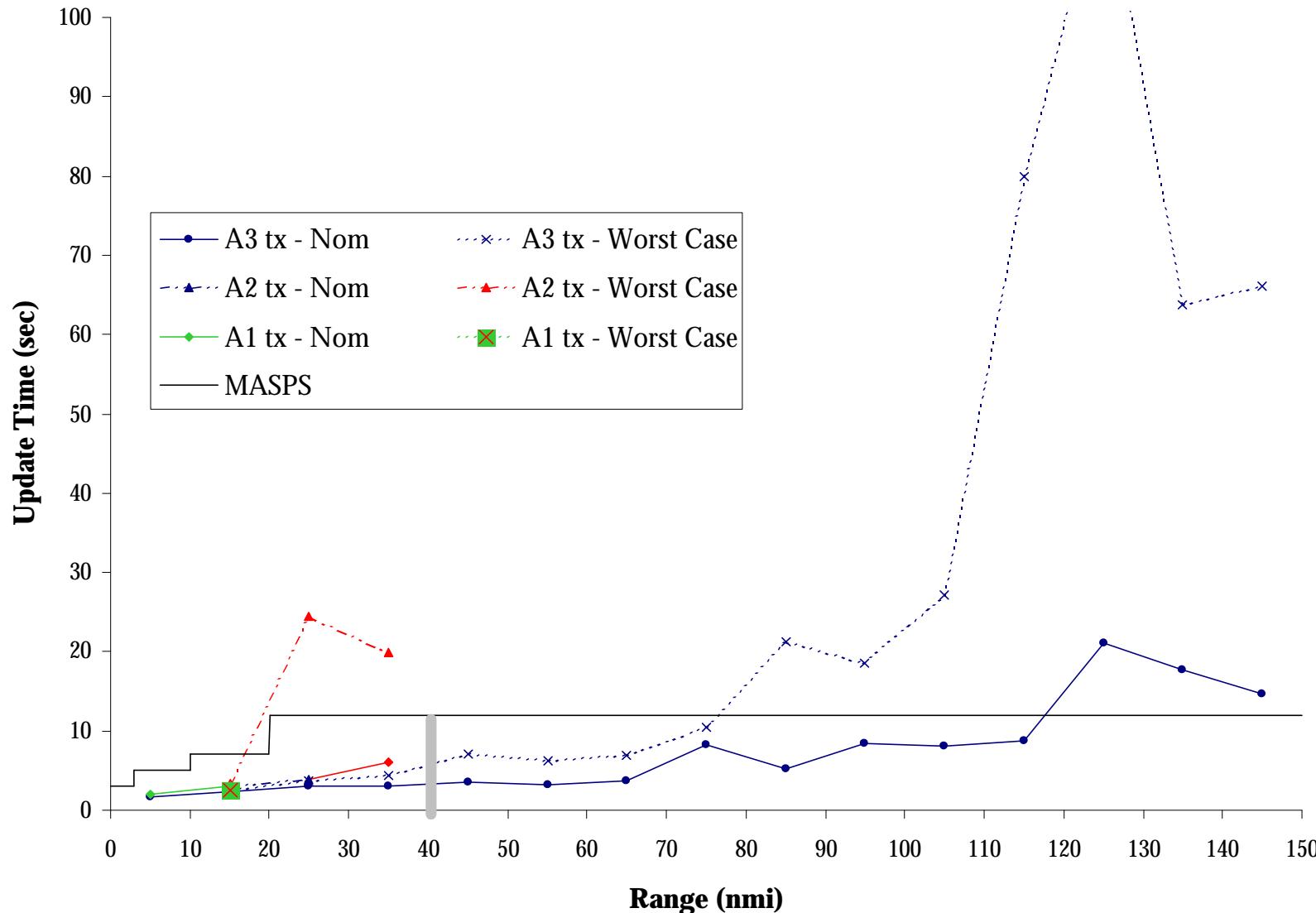
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- 0.8 MHz filter performs slightly better than 1.2
  - ◆ On channel DMEs not greatly affected by filter selection
- Some distinctions between Brussels and worst case scenarios
  - ◆ A1 performance meets MASPS requirements for both cases
  - ◆ A2 performance does not meet MASPS requirements for worst case
  - ◆ A3 for worst case does not always reach 90 nmi for 1.2 MHz filter

# Current State Vector Update Times for Switched Receiver at High Altitude with 1.2 MHz Filter



# Current State Vector Update Times for Switched Receiver at FL150 with 1.2 MHz Filter



# Current Scenario Conclusions for Switched Receiver

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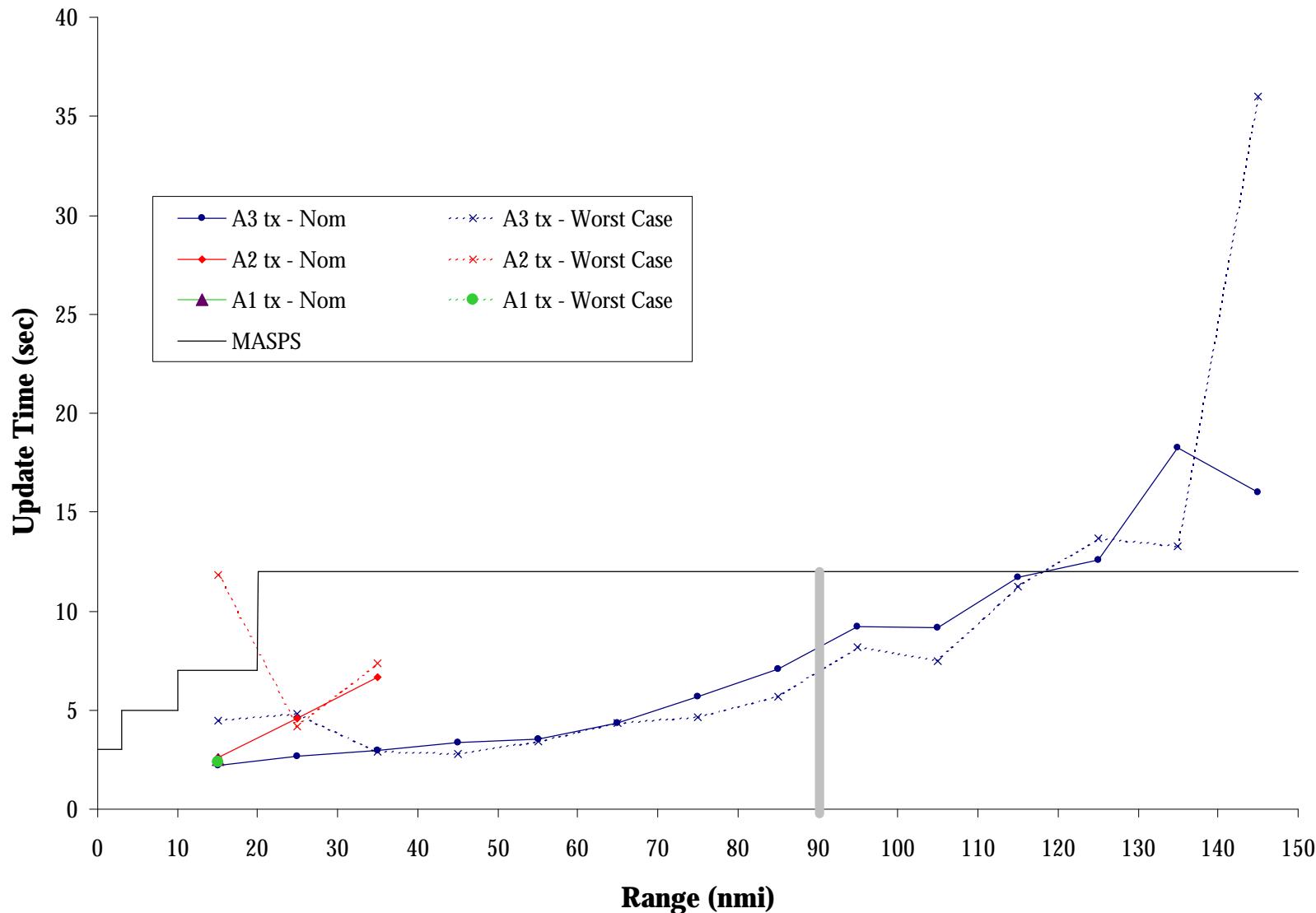
- Some distinctions between Brussels and worst case scenarios
  - ◆ A2 performance does not meet MASPS requirement for worst case
  - ◆ A1, A3 performance meet MASPS requirement for both cases

# Future Scenario Results

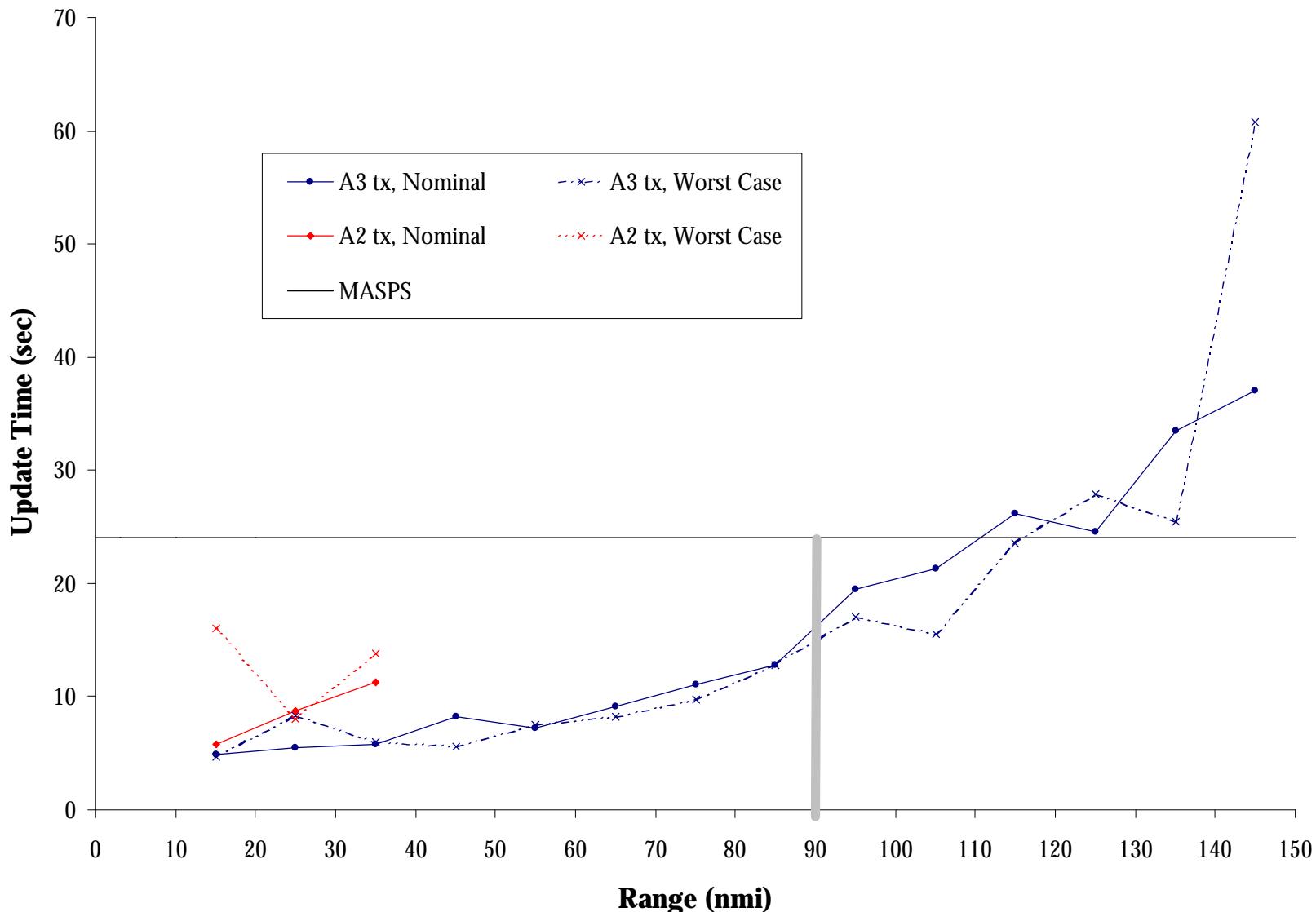
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- Two locations
  - ◆ Brussels – highest density air traffic area, conservative DME estimates
  - ◆ Worst case – lower density air traffic, greater DME interference
- DME levels as calculated for two flight levels
  - ◆ Most traffic in view (high altitude)
  - ◆ FL 150
- Performance in 2015 with all on-channel DMEs cleared from channel and implementation of all potential planned DMEs at 979 MHz
- Different receiver types

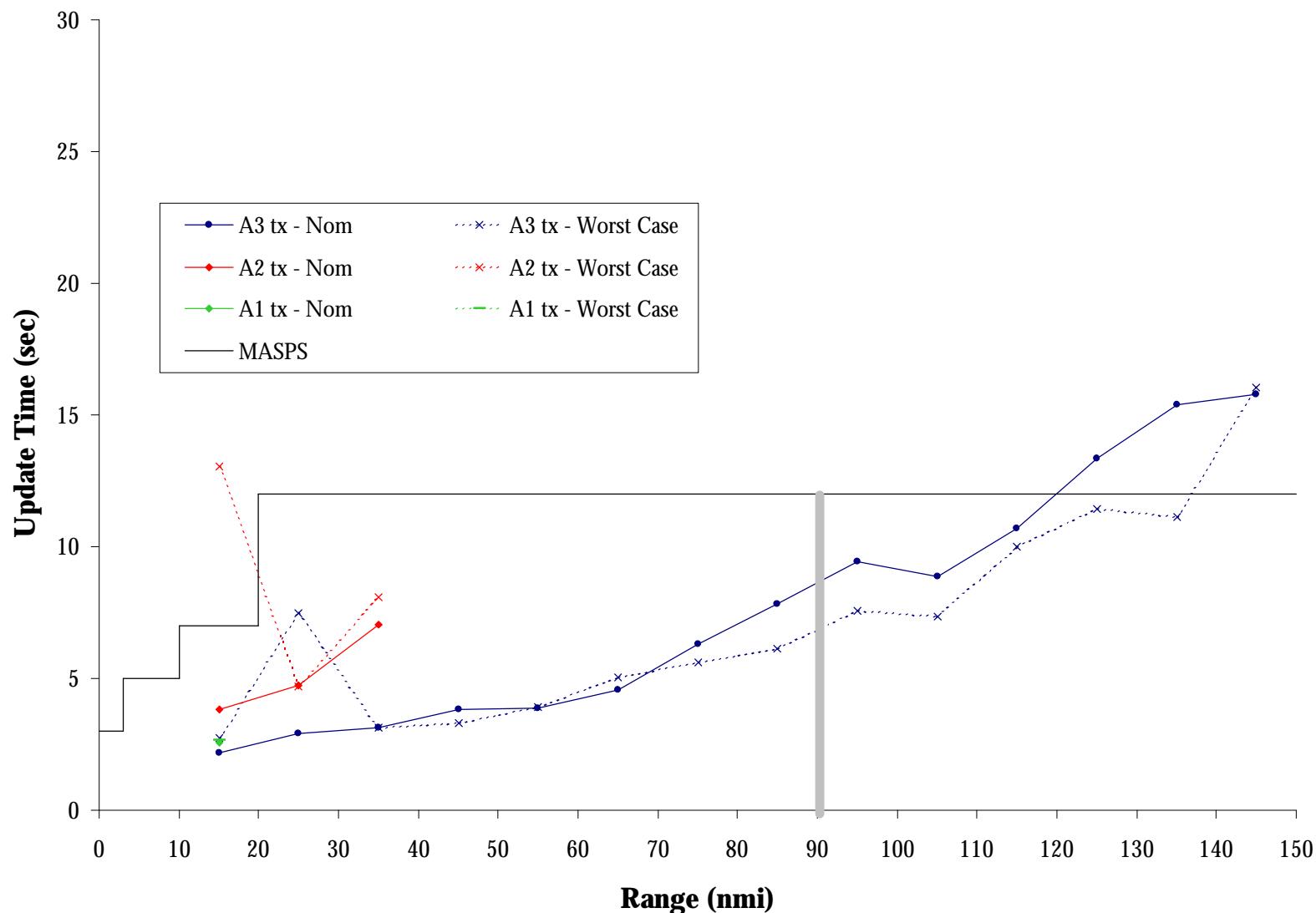
# Future State Vector Update Times for Diversity Receiver at High Altitude with 1.2 MHz Filter



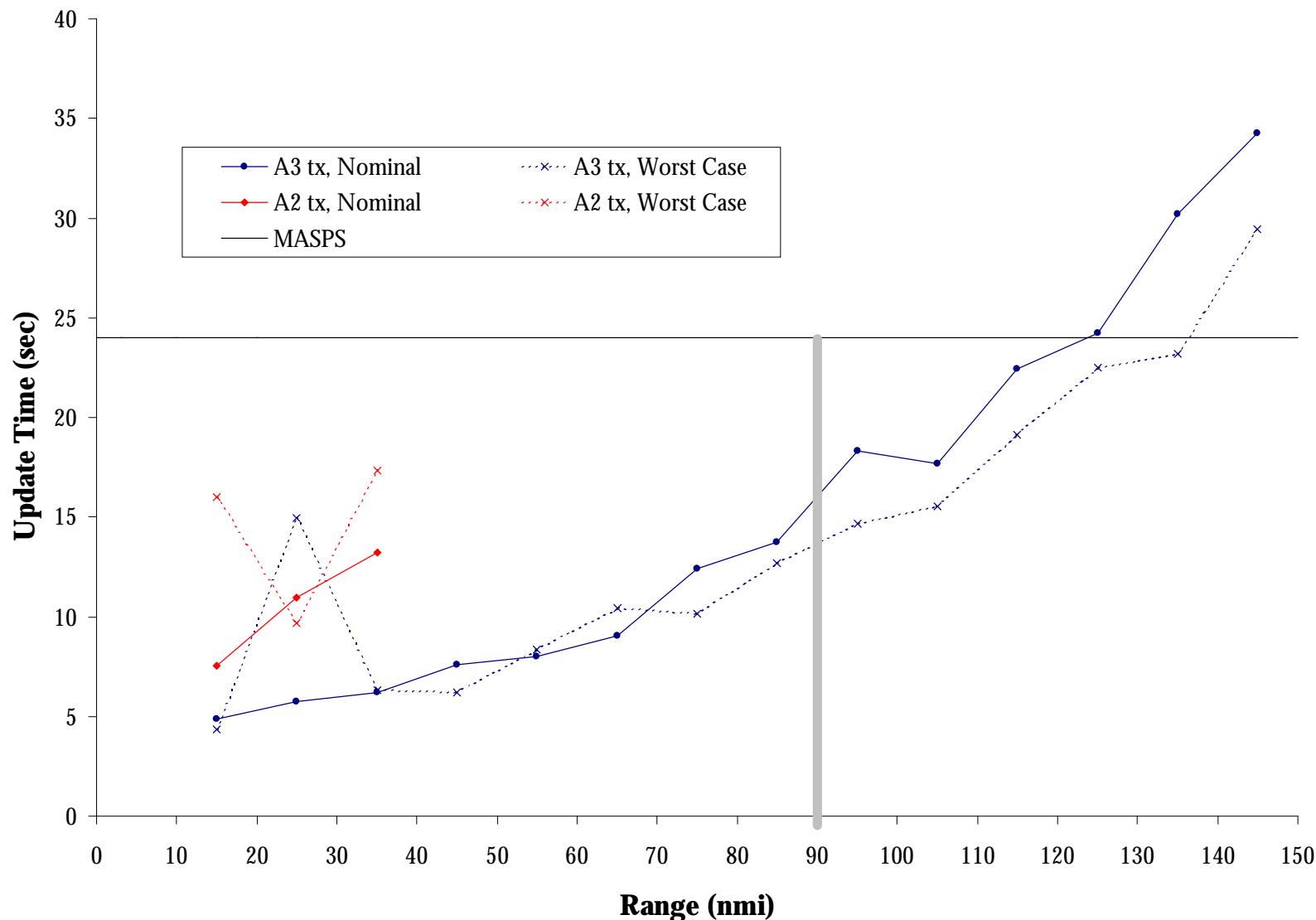
# Future TCP Update Times for Diversity Receiver at High Altitude with 1.2 MHz Filter



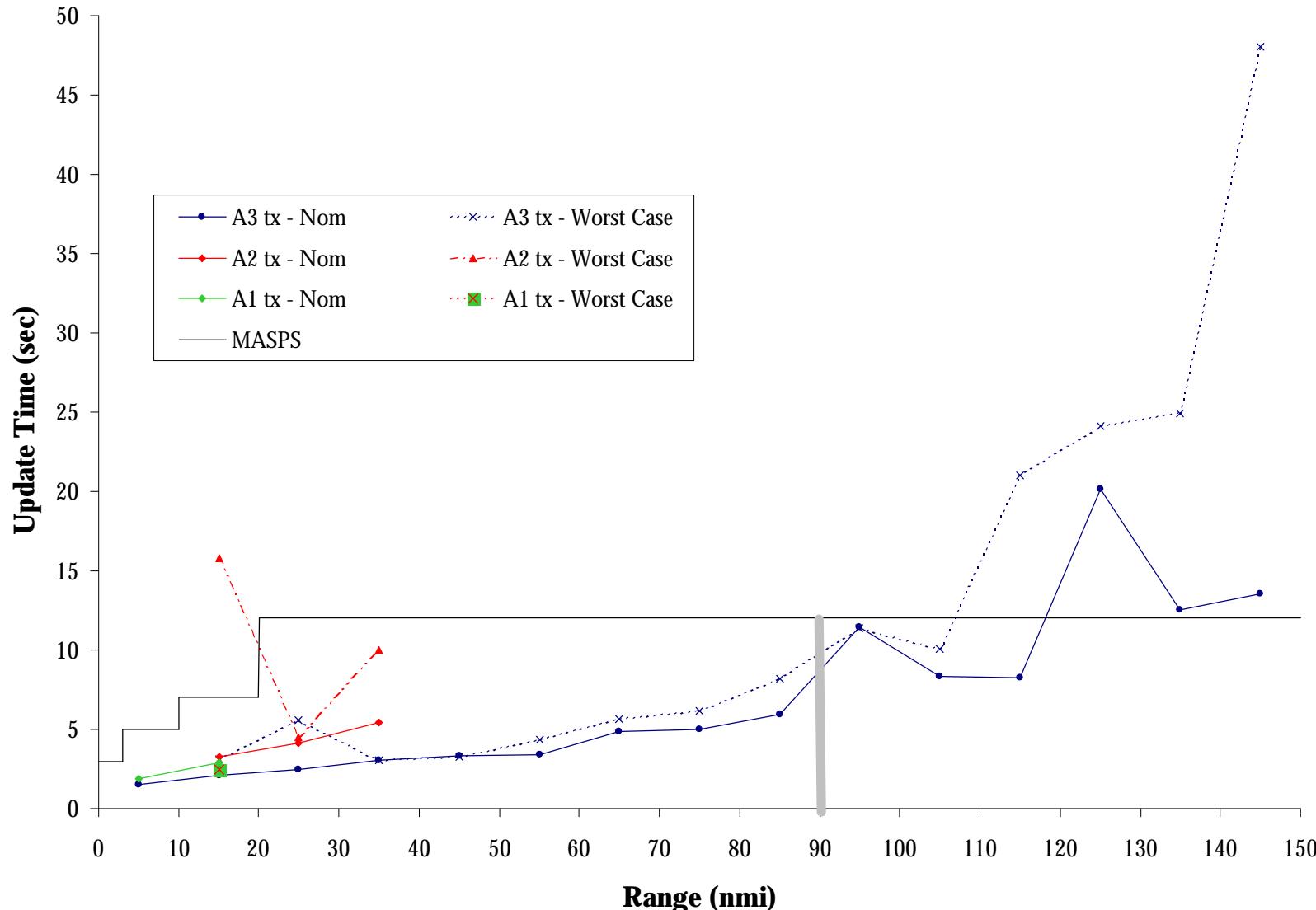
# Future State Vector Update Times for Diversity Receiver at High Altitude with 0.8 MHz Filter



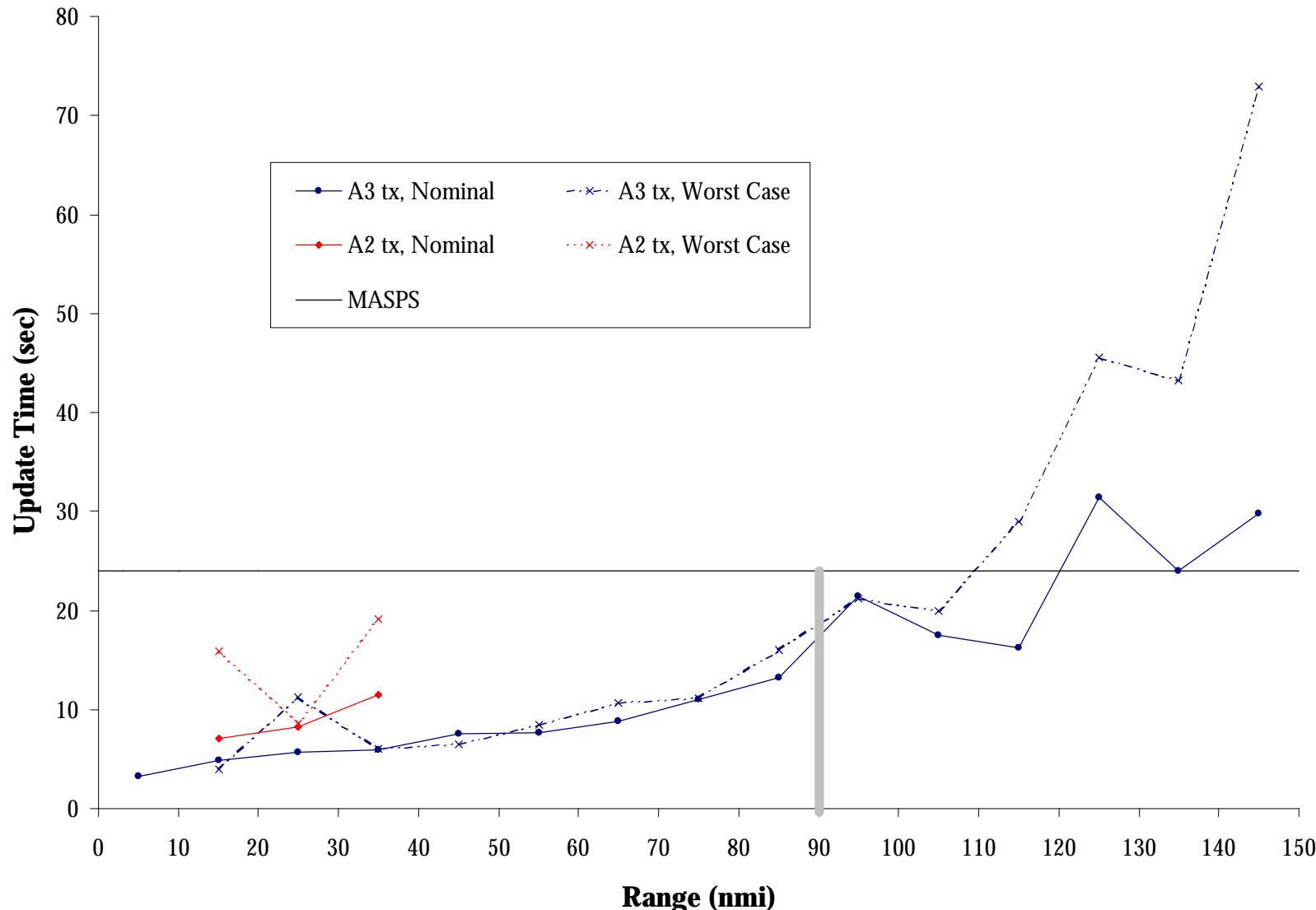
# Future TCP Update Times for Diversity Receiver at High Altitude with 0.8 MHz Filter



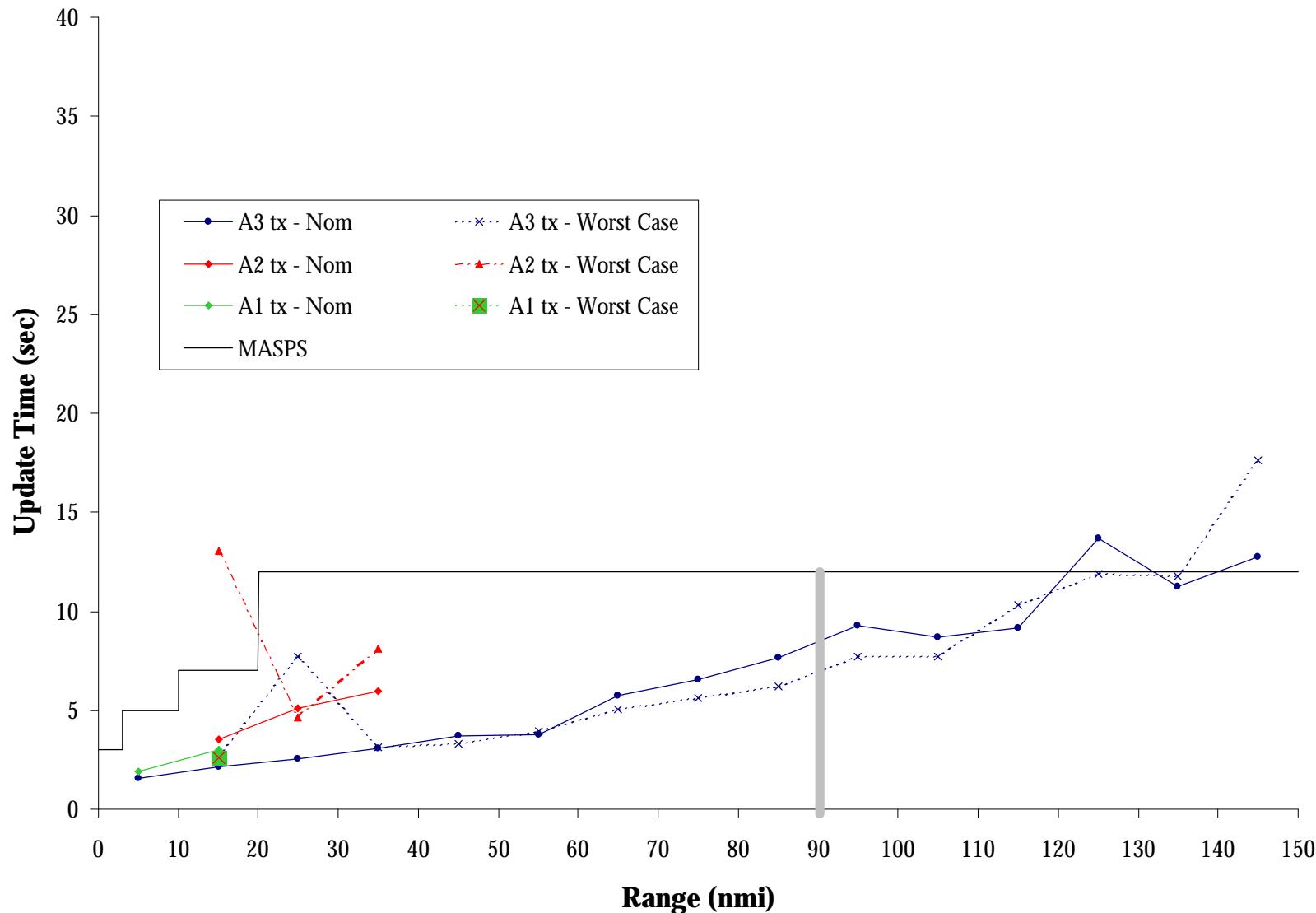
# Future State Vector Update Times for Diversity Receiver at FL150 with 1.2 MHz Filter



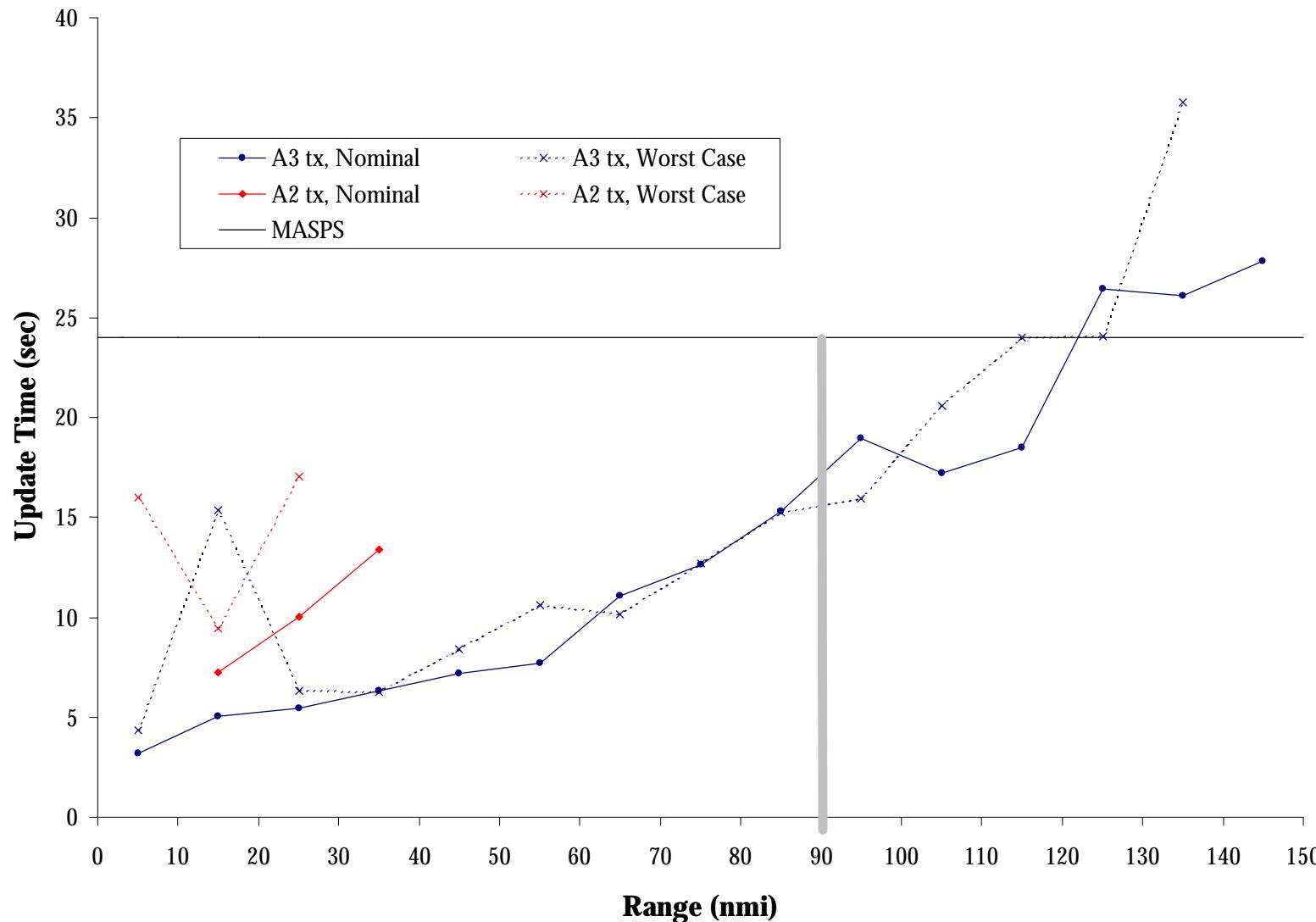
# Future TCP Update Times for Diversity Receiver at FL150 with 1.2 MHz Filter



# Future State Vector Update Times for Diversity Receiver at FL150 with 0.8 MHz Filter



# Future TCP Update Times for Diversity Receiver at FL150 with 0.8 MHz Filter

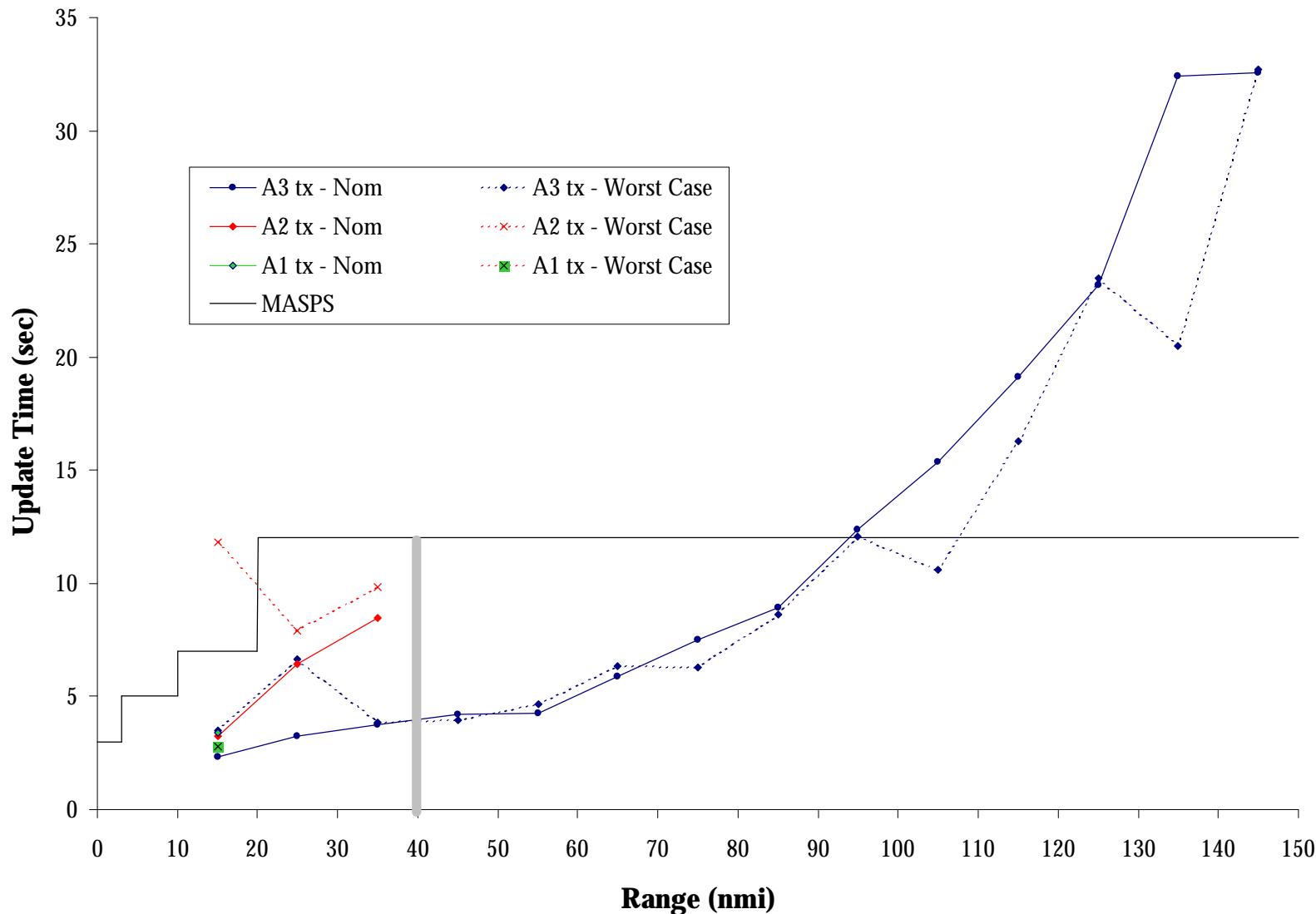


# Future Scenario Conclusions for Diversity Receiver

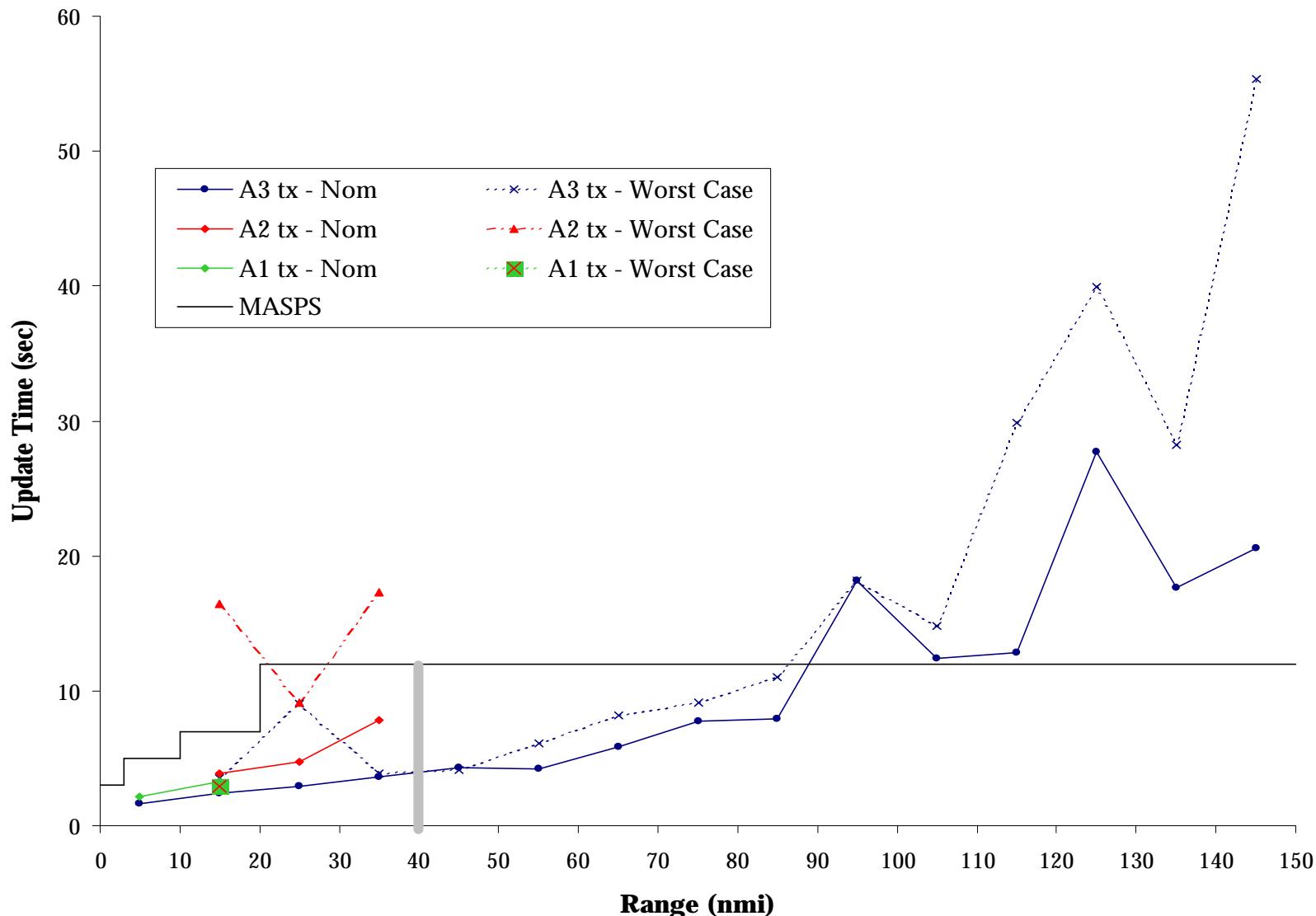
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- 0.8 MHz filter performs better than 1.2
- Some distinctions between Brussels and worst case scenarios
  - ◆ A1, A3 performance meet MASPS requirements for both cases
  - ◆ A2 performance does not meet MASPS requirements for worst case for both filters

# Future State Vector Update Times for Switched Receiver at High Altitude with 1.2 MHz Filter



# Future State Vector Update Times for Switched Receiver at FL150 with 1.2 MHz Filter



# Future Scenario Conclusions for Switched Receiver

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- Some distinctions between Brussels and worst case scenarios
  - ◆ A1, A3 performance meet MASPS requirements for both cases
  - ◆ A2 performance does not meet MASPS requirements for worst case